

**ENG EK 125 Introduction to Programming for Engineers Spring 2020**  
**SYLLABUS**

**(Classes and discussions listed; labs always follow classes)**

<b>Date</b>	<b>Topics</b>
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<b>Week # 1</b>	
1/22	Class 1: Introduction to EK 125; Introduction to MATLAB, Characters, Relational expressions (M Chapter 1)
1/24	Discussion 1: Problem solving techniques; Mock quiz
<b>Week # 2</b>	
1/27	Class 2: Vectors, Matrices (M Chapter 2)
1/29	Class 3: Intro to Programming, Scripts, I/O, Plots (M 3A: Sec 3.1-3.6)
1/31	Discussion 2: Quiz 1
<b>Week # 3</b>	
2/3	Class 4: Functions, Programs, Commands (M 3B: Sec 3.7-3.9)
2/3	<i>Last day to add a course</i>
2/5	Class 5: If statements, Relational expressions; switch statements; “is” functions (M Chap 4)
2/7	Discussion 3: Quiz 2
<b>Week # 4</b>	
2/10	Class 6: Loops: for, nested (M5A: Sec 5.1-5.2)
2/12	Class 7: Loops: while, error-checking; Vectorizing, Timing Code (M 5B: Sec 5.3 - 5.5)
2/14	Discussion 4: Quiz 3
<b>Week # 5</b>	
2/17	<i>Holiday; No Classes</i>
2/18	<i>Monday Schedule at BU;</i> Class 8: User-defined functions, MATLAB program organization (M 6A: Sec 6.1-6.3)
2/19	Class 9: Exam Review
2/21	Discussion 5: Exam Review
<b>2/21</b>	<b>*** EXAM # 1    4:40 – 6:20 pm    Room: MOR 101</b>

### **Week # 6**

- 2/24 Class 10: Scope, persistent variables, Debugging, Live scripts (M 6B: Sec 6.4-6.6)
- 2/25 *Last day to drop a course (without a "W")*
- 2/26 Class 11: Text Manipulation (M Chapter 7)
- 2/28 Discussion 6: Quiz 4

### **Week # 7**

- 3/2 Class 12: Cell arrays, Intro to Structs (M 8A: Sec 8.1-8.2.3)
- 3/4 Class 13: Advanced data structures (M 8B: Sec 8.2.4-8.3)
- 3/6 Discussion 7

**3/7-3/15 Spring Break; No classes**

### **Week # 8**

- 3/16 Class 14: Data Transfer (M Chap 9)
- 3/18 Class 15: Advanced functions: variable # of arguments, nested functions (M Sec 10.1-10.2)
- 3/20 Discussion 8: Quiz 5

### **Week # 9**

- 3/23 Class 16: Statistics, Sets, Intro to Machine Learning (M 14A: Sec 14.1-14.3, additional notes online)
- 3/25 Class 17: Exam Review
- 3/27 Discussion 9: Exam Review
- 3/27 \*\*\* EXAM # 2 4:35 – 6:20 pm Room: MOR 101**

### **Week # 10**

- 3/30 Class 18: Command Line Interfaces; Intro to C (C Chapter 1)
- 4/1 Class 19: Selection Statements and Loops (C Chapter 2)
- 4/3 *Last day to drop a course (with a "W")*
- 4/3 Discussion 10: Quiz 6

### **Week # 11**

- 4/6 Class 20: Data Structures: Arrays, Strings, and Structures (C Chapter 3)
- 4/8 Class 21: Introduction to Functions and Program Organization in C;  
Pointers, Call-by-reference (C 4A and 4B: Sec 4.1-4.7)
- 4/10 Discussion 11

### **Week # 12**

- 4/13 Class 22: Dynamic Memory Allocation; Introduction to Linked Lists (C  
5A and 5B: Sec 5.1-5.2.3)
- 4/15 Class 23: Common Operations on Linked Lists (C 5C: Sec 5.2.4 – 5.2.5)
- 4/17 Discussion 12: Quiz 7

### **Week # 13**

- 4/20 *Holiday; No classes*
- 4/22 *Monday Schedule at BU; Class 24: Exam Review*
- 4/24 Discussion 13: Exam Review
- 4/24 \*\*\* EXAM # 3 4:35 – 6:20pm Room: MOR 101

### **Week # 14**

- 4/27 Class 25: What's Next; Course Evaluations; Project Presentations
- 4/29 Class 26: Final Project Due
- 4/30 *Last Day of Classes*

**ENG EK 125 Introduction to Programming for Engineers**  
**Spring 2020**  
**COURSE INFORMATION**

Cast of Characters

Professor: Stormy Attaway

Department of Mechanical Engineering

110 Cummington Mall, Room 112

Office phone: (617) 353-5224

Office FAX: (617) 353-5866

Home phone: (603) 878-2760

email: sa@bu.edu

Office Hours: Vary weekly; posted on the board outside of my office every week

Graduate Student Teachers (GST): TBD

Teaching Assistants (TA's):

- TBD; See list in PHO 117
- The TA's are undergraduates and LEAP students. Their duties are to help in the class, lab and the discussion sections, and grade the weekly quizzes. Some experienced TA's are designated as "Senior TA's"; they may lead discussion sections.
- TA Open Hours will be held in PHO 117, generally the evenings before class days. Check the course web site on edge for details.

Course Material

The goal of this course is to introduce first-year engineering students to modern computational environments used to solve engineering problems. In the context of engineering applications, basic procedural programming concepts will be covered including input/output, branching, looping, functions, file input/output, data structures (arrays, strings, and structures), pointers, and memory management. Emphasis will be on programming style, debugging, top-down design and modular code. Specific topics are listed in the course syllabus.

Course Outcomes

As an outcome of completing this course, students will:

- Gain knowledge of basic procedural programming concepts and computational thinking
- Become proficient in the use of modern computational tools
- Develop basic problem solving skills
- Develop experience in designing a solution to engineering problems using software
- Be able to document solutions to engineering problems and communicate the results
- Work in teams to design a solution to a societal problem

BU Hub Learning Outcomes

This course covers:

- Quantitative Reasoning I
- Creativity/Innovation

## Course Format

All students must be registered for one Lecture section, one Lab section, and one Discussion section. The lecture/class sections are Mon/Wed. These are taught in PHO 117. The labs in all cases follow the lectures; they are held Mon/Wed afternoons, in PHO 117. The discussion sections are all on Friday. (Note that the Fri 4:30-6:15 time listed under “Lecture” is actually the exam time; see syllabus for those dates.) Many sections become full quickly, so it is imperative that you only attend those sections for which you are officially registered. Waiting lists will be maintained in the beginning of the semester for anyone who wishes to change into a section that is full, on a first-come-first-served basis.

The specific topics that will be covered in the classes are listed in the course syllabus. Students are expected to do the reading, view the lecture videos, and to complete all online assessment problems before coming to class. The class period will consist of an active learning environment. During a majority of the class time, students will be actively working on problems first as individuals and then in groups, either on paper or on the white board walls.

During the lab, there will be worksheet problems to work on, based on the material covered in the lecture earlier that day. All worksheet solutions must be tested, either in MATLAB or in C. It is expected that students will bring their own laptops to lab. As a continuation of the lab, problems to be done on MATLAB Grader during the MATLAB portion of the course will be posted in the evenings after the lab sections have ended. Extra problem sets will also be available for students who wish to have more programming experience; these are optional.

In the discussion sections on Fridays, the Senior TAs in charge of the section will review the week’s material, and answer any questions that students may have. In some cases, extensions of the material will be covered also. In most of the discussions, there will then be a short (15 minute) quiz on the material covered that week (the exact dates are listed in the syllabus).

## Textbook

The text is “MATLAB: A Practical Introduction to Programming and Problem Solving, Fifth Edition” by Stormy Attaway, © 2018 Elsevier, Inc. ISBN: 978-0-12-815479-3. For the last part of the course, a pdf of a manuscript “C Programming for MATLAB Programmers” will be available for students to use online. The sections to be read before each lecture are listed in the syllabus next to the topic. For best comprehension, it is very important to read through everything including the Quick Questions, and to work on the Practice problems. Note we are using the Fifth Edition of the MATLAB book, which is organized in a slightly different way and contains much more material than the first four editions. Either hard copy or e-book is fine.

## Grading

Letter grades are given only for the entire course, not for individual assignments or tests. Numerical grades will be calculated for every student, based on the following percentages:

Class (including online pre-class & in-class Practice Problems)	18%
Lab (including Worksheets and MATLAB Grader Problems)	12%

Homeworks and Final Project	13%
Discussions (including Quiz Average)	12%
Exam 1	15%
Exam 2	15%
Exam 3	15%

Class, Lab, and Discussion grades include attendance. The cut-offs for the different letter grades will depend on the distribution of numerical grades at the end of the semester.

Usually, the ranges are: 90 and above is an A (A- or A), 80 + is a B, 70+ is a C, 60+ is a D and below 60 is an F. (There may be a curve, but if so it would be in the favor of the students, e.g. an A- might go as far down as 89, but it would not be raised to 91.) The cutoffs between the letter grades for a given range (e.g., B+, B, B-) will depend on the actual numerical grades and will not be determined until the end of the semester. In addition to the numerical average, students **must demonstrate a mastery of the material by having a passing average on the last two exams and on the Homeworks/Final Project** in order to earn a passing grade in the course.

### Class Grade

Students are expected to be on time for every class, and are expected to be prepared for every class by doing the reading and completing all online material. Please note that the reading covers all of the material; the online slides do not necessarily cover everything. Therefore, the online materials supplement the reading; they do not replace the reading. During the class period, students will be given sets of Practice Problems. Individual Practice Problems (IPP) are to be completed in the very beginning (first five minutes) of the class period, without using any reference materials. These will be followed by Group Practice Problems (GPP) to be done in small groups; reference materials may be used for these problem sets. Students may NOT work alone on the GPP. Students are requested to NOT use software (MATLAB or C) during class. Points will be deducted from the class grade if a student (a) arrives late; (b) is not prepared; (c) leaves early; or (d) does not answer Practice Problems. The class grade will be a combination of attendance, online, and in-class Practice Problem solutions, including the 5-minute IPP that will be graded. One class attendance grade and one IPP grade will be dropped.

### Lab Attendance

For the lab, students will be given worksheet problems to work on during the lab period. Students will receive full credit for every lab for arriving on time and either completing all of the **current** worksheet problems in MATLAB or C, or spending the full amount of time diligently working on these problems. Points will be deducted from the lab attendance score if a student (a) arrives late; (b) is not prepared for lab; (c) leaves early without completing all of the worksheet problems in MATLAB or C; (d) does not spend the time diligently working on the current problems; or (e) spends time working on other worksheets (e.g. old ones not yet completed) or homeworks (or doing anything online) instead of the current worksheet. Missed labs must be made up in the lab, during the open lab hours, as soon as possible. All worksheet problems must be completed. For the lab attendance grade, students must only work diligently on the problems during the lab, and may not use computers for any other purpose until the problem set has been completed. If the worksheet problems are not completed during the lab period, students must return to the lab during open hours to complete at least those problems (this becomes part of the worksheet grade; see below). One lab attendance grade will be dropped. Students may swipe in and out of the lab; ID cards may be held during the lab period.

## Worksheets

For full credit on the worksheet, the solutions for the worksheet problems must be completed, BEFORE THE NEXT LAB. For the MATLAB part of the course, MATLAB Grader Problems must also be completed before the next lab. The solutions to these problems must be submitted on the MATLAB Grader site. For these problems, test scripts have been written by the course staff to test whether your solution not only works in MATLAB, but does exactly what the problem specifies. The solutions to all problems (worksheet and Grader) must be completed by the **beginning** of the lab period (when you walk in the door). Sometimes the problems will be simply checked off, and sometimes particular solutions will be graded. Students must be present in lab for these random worksheet checks. These checks will not be announced in advance; students should always be prepared with all solutions from the lab one lab section prior. The grading will be on both the correctness of the solution and style. One worksheet grade will be dropped. If a student knows that s/he will not be able to attend a lab, the entire worksheet that is to be checked may be submitted by email to one of the TA's for that section BEFORE the lab period in order to receive credit.

## Homework Assignments

Homeworks will be assigned throughout the semester. Due dates and rules for working in groups will be specified on each homework description. Homework assignments will be announced on the course web site on edge.

## Final Project

The final project will be due on the last EK 125 class day of the semester. This is a programming problem, which is larger in scope than the problems that can be done during the scheduled lab periods. It will also be an open-ended problem, for which there is no set answer. Specific guidelines will be provided at least six weeks before the project due date. The project is to be completed during the open lab hours. Late projects will NOT be accepted, for any reason. The final project will be a group project. PROGRAMS THAT DO NOT RUN WILL NOT NORMALLY BE ACCEPTED.

## Quizzes

There will be 7 quizzes this semester, given during the discussion sections. The exact dates are listed in the syllabus. Each quiz will be on the material covered that week. There will be NO make-ups for quizzes for any reason; however, one of the grades will be dropped before the quiz average is calculated. All of the quizzes will be closed book. All quizzes must be taken in the discussion section for which the student is officially enrolled; otherwise, the grade will not count. No electronic devices (calculators, cell phones, etc.) will be allowed during quizzes.

## Exams

There will be three exams, given on Friday afternoons. These are common exams, given to all sections of this class at once. Since they will not be during the regularly scheduled class time, mark the dates on your calendar! The first exam will be given on Friday February 22 from 4:40 – 6:20pm. The second exam will be given on Friday, March 27 from 4:35 – 6:20pm. The third exam will be given on Friday, April 24 from 4:35 – 6:20pm. Exam locations will be announced in class. All exams are closed book. However, student will be allowed to bring one 8.5x11" piece of paper with notes, double

sided (Note: no staples or tape, just one sheet of paper). No electronic devices (calculators, cell phones, ear buds, etc.) will be allowed during exams.

Exam study sessions will be held on the evenings before the exams.

### Make-ups

As explained in previous sections, there are no make-ups for homeworks, projects or quizzes. Since most students will have a valid reason for missing a class during the semester (for example, due to illness), one class attendance grade will be dropped, one IPP grade will be dropped, one lab attendance grade will be dropped, one worksheet check grade will be dropped, one discussion attendance grade will be dropped, and one quiz grade will be dropped. Missed lab attendance must be made up during the open lab hours by completing the worksheet problems (for full credit if the lab was missed for a valid reason, otherwise half credit). Worksheet solutions must be completed before the next lab session. Worksheets may be submitted to a TA before lab if a lab is to be missed, but there are no make-ups after the lab for the worksheet checks.

### Make-up Exams

Make-up exams will be more difficult than the regularly scheduled exams. The only valid reasons for missing an exam are: death in the immediate family, serious illness (documented by a physician), or a conflict with a scheduled Boston University event. If you feel that you have a valid reason for missing an exam, you must petition to Prof. Attaway for permission to take the make-up. This petition must be received BEFORE the regularly scheduled exam (except in cases of extreme emergency). Petitions should be submitted as soon as possible. Petitions are not always granted! If the petition is granted, a mutually convenient time for the make-up exam will be arranged.

### Incompletes

Incompletes will ONLY be given for those students who miss the third exam and whose petitions for the make-up have been granted, and for whom the make-up has been scheduled for a time after the final grades for the semester have been determined. An incomplete contract must be filed in that case before the end of the semester.

### Grievance Procedure

If you disagree with any grade received in this course, you must write a short note explaining your reasons on a separate sheet of paper, attach it to the paper in question (exam, quiz, etc.) and give it to one of your lab or your discussion TAs. It will be reviewed, and returned to you.

### Collaboration Policy

Students are allowed (in fact, encouraged) to work together on the Practice problems and on the lab worksheets, and in groups on the project. Working together means truly working together, exchanging ideas, NOT copying. Copying another's work is cheating, as is allowing someone else to copy your work. All quizzes and exams must be done by each student individually. Falsifying information on a group project cover sheet will also be considered to be cheating. Anyone caught cheating may be subject to disciplinary action by the Committee on Student Conduct of the College of Engineering. Also, anyone found guilty of cheating will receive a 0 for that particular grade. Please note that

these are policies for ENG EK 125; other courses may have different policies. When in doubt, ask before you collaborate! Please remember the University's Academic Conduct Code, which can be found at: <https://www.bu.edu/academics/policies/academic-conduct-code/>

## Cell Phone Abuse

It is not appropriate to have a cell phone on during any class (lecture, lab, discussion), exam, or while in the lab. Therefore, **cell phones must always be turned off**. Any violation of this will result in a 0. For example, if a cell phone is used during class time, the student will receive a 0 for that day's attendance. If a cell phone is used during a discussion section, the student will receive a 0 on that day's quiz. If a cell phone is used during an exam, the student will receive a 0 on the exam. **Leaving a class/discussion/exam to use a cell phone elsewhere (e.g., in the hallway) will be considered to be the same as using it in the class.** The exception to this policy is any legitimate use of MATLAB Mobile.

## Resources/Support/How to Succeed in This Course:

- Office hours are held by Professor Attaway, and Open Hours are held by the TA's. Please see the beginning of this document for details.
- Accommodations for Students with Documented Disabilities: If you are a student with a disability or believe you might have a disability that requires accommodations, please contact the Office for Disability Services (ODS) at (617) 353-3658 to coordinate any reasonable accommodation requests. ODS is located at 19 Deerfield Street on the second floor. For students who receive extra time on quizzes and exams, please let Professor Attaway know (even if you do not yet have the official documentation) and email your schedule so that alternate times may be determined.